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EXAMINER	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MEDHAT A. TOUKHY,
and JOSEPH E. OBERLANDER

Appeal 2009-1155
Application 10/677,318[1]
Technology Center 1700

Decided:[2] March 24, 2009

Before BRADLEY R. GARRIS, MARK NAGUMO, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

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[1] Application 10/677,318, *Bottom Antireflective Coatings*, filed 3 October 2003. The specification is referred to as the "318 Specification," and is cited as "Spec." The real party in interest is listed as AZ Electronic Materials USA Corp. (Appellants' Brief under 37 C.F.R. § 41.67 [sic: 41.37], ("Br."), 2.)

[2] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

DECISION ON APPEAL

A. Introduction

Medhat A. Toukhy and Joseph E. Oberlander ("Toukhy") timely appeal under 35 U.S.C. § 134(a) from the final rejection[3] of claims 1-9 and 32-37. We have jurisdiction under 35 U.S.C. § 6(a). We affirm.

The subject matter on appeal relates to antireflective coating compositions said to be useful as undercoatings for photoresist compositions, i.e., as "bottom antireflective coatings," or "BARCs." The claimed coating compositions are required to contain at least one of several named bases, which are "not soluble in a solvent of the photoresist composition." The claims do not limit, nor does the 318 Specification define the composition of the photoresist.

Representative Claim 1 is reproduced in most relevant part from the Claims Appendix to the Principal Brief on Appeal:

Claim 1

> An antireflective coating composition useful with a photoresist composition comprising
>
> an antireflective coating composition having at least one base which is not soluble in a solvent of the photoresist composition,
>
> > wherein said at least one base which is not soluble in a solvent of the photoresist composition is selected from optionally substituted aminophylline, optionally substituted purine, . . . optionally substituted guanine, . . . optionally

[3] Office action mailed 8 November 2007.

> substituted guanine, . . . optionally substituted adenine, . . . and mixtures thereof.

(Claims App., Br. 34; numerous classes of optionally substituted compounds omitted, paragraphing added.)

The Examiner has maintained the following grounds of rejection:[4]

A. Claims 1-9 and 32-37 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking an enabling disclosure for the full scope of the claimed antireflective compositions.

B. Claims 1-9 and 32-37 stand rejected under 35 U.S.C. § 102(b) in view of Hasegawa.[5]

C. Claims 1-9 and 32-37 stand rejected under 35 U.S.C. § 102(b) in view of Sato.[6]

D. Claims 1-9 and 32-37 stand rejected under 35 U.S.C. § 102(e) in view of Nishimura.[7]

Toukhy contends the Examiner failed to provide a sufficient explanation of why the claims are not enabled for the full scope of the claims, in that reason to doubt the objective truth of supporting statements has not been established. (Br. 4-5.) More particularly, Toukhy argues that "[t]he term antireflective coating composition in itself contains polymers, binders and other components that make it work. This is clearly understood

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[4] Examiner's Answer mailed 21 May 2008. ("Ans.").

[5] Koji Hasegawa et al., *Lactone-Containing Compounds, Polymers, Resist Compositions, and Patterning Method*, U.S. Patent 6,280,898 B1 (2001.)

[6] Kenichiro Sato et al., *Positive Photoresist Composition for Far Ultraviolet Ray Exposure*, U.S. Patent Application Publication US 2002/0098440 A1 (25 July 2002).

[7] Yukio Nishimura et al., *Radiation-Sensitive Resin Composition*, U.S. Patent 6,800,414 B2 (5 October 2004), based on an application filed 14 June 2001.

by the skilled artisan." (Br. 8-9.) Toukhy urges further that the 318 Specification cites prior art and provides examples and descriptions, all of which show that antireflective coating compositions are known to the art. (Br. 9, citing the 318 Specification, pages 3-4 (citing prior art patents said to describe bottom antireflective coatings) and pages 12-14 (describing Examples in the Specification)).

The Examiner responds that the 318 Specification indicates that, in addition to the recited base, an antireflective layer needs a polymer binder and a radiation absorber, if the polymers and the bases do not absorb radiation. (Ans. 3.) Moreover, according to the Examiner, the 318 Specification does not define antireflective layers to limit the antireflective layer compositions to such compositions. (*Id.*) The Examiner contends that the additional critical components should be recited expressly in the claims. (Ans. 6.)

The critical issue underlying the enablement rejection is whether the term "antireflective coating composition" ("ARCC") would have been understood to refer to a composition that contains the non-recited polymer binder and the radiation absorber.

As for the rejections over prior art, Toukhy does not argue for the separate patentability of any claims. Accordingly, we restrict our consideration to the argued limitations of claim 1, with which the remaining claims stand or fall. 37 C.F.R. § 41.37(c)(1)(vii). Moreover, Toukhy does not contest any of the Examiner's specific findings that the bases disclosed in the references are recited in the rejected claims. Because such arguments

have been waived (*id.*), we accept the Examiner's findings of fact for the purpose of deciding this appeal.

According to Toukhy, the "fatal flaw" in the Examiner's rejection is the failure to establish that the references provide an "antireflecting coating composition useful with a photoresist composition" that "contains at least one base that is not soluble in a solvent of the photoresist composition." (Br. 26 (Hasegawa and Sato); and 28-29 (Nishimura).) Rather, in Toukhy's view, the applied references "require that the components in their photoresist compositions be soluble in the photoresist solvent used in their respective photoresist compositions. This clearly teaches away from appellants' claims." (Br. 24 (Hasegawa and Sato); *cf.* Br. 29, first paragraph (Nishimura).)

The Examiner responds that the references have all the required components (i.e., the base), and that the properties of the compositions must therefore be the same. (Ans. 6-7.) Moreover, the Examiner points out that each reference also has a polymer binder and a radiation absorber (a photoacid), which would provide the radiation absorption required to make the composition function as an antireflective coating composition. (*Id.* at 7.) As for the recited solubility property of the base, the Examiner argues that the claims define solubility with respect to a solvent that is not specified, so the solubility of the bases is also not specified. (*Id.*) Finally, the Examiner argues that Toukhy relies on the intended use of the compositions to distinguish over the prior art. The intended use, argues the Examiner, even if it were recited in the claims, would not materially distinguish the claimed subject matter from the same compositions described in the prior art. (*Id.*)

The dispositive issue regarding the rejections over prior art is whether Toukhy has shown that the Examiner's claim interpretation incorrectly fails to account for limitations of the claimed subject matter.

B. Findings of Fact

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

1. Reflection from a layer underlying the photoresist is said to limit the resolution of features patterned into the photoresist via the "standing wave" effect, i.e., constructive and destructive interference that is especially significant when monochromatic radiation (e.g., from a laser) is used to expose thin layers of photoresist. (Spec. 2, l. 7 to 3, l. 6.)

2. According to the 318 Specification, the prior art has addressed this problem by providing various Bottom Antireflective Coatings ("BARCs") that comprise a radiation absorbing material. (Spec. 3, l. 16 to 4, l. 8.)

3. An issue confronting such BARCs is said to be the solubility of BARC components in the casting solvent used for the photoresist layers. (Spec. 4, ll. 10-13.)

4. The 318 Specification teaches that when the photoresist solution is poured on top of the BARC, components of the BARC that are soluble in the casting solvent tend to migrate into the photoresist composition and to thus degrade the antireflective function of the BARC. (Spec. 4, ll. 13-19.)

5. The improvement found by the present inventors is said to lie in the use of basic compounds that are not soluble in the solvent of the photoresist composition. (Spec. 5, ll. 1-2.)

6. The use of bases that are not soluble in the solvent of the photoresist composition is said to maintain the integrity of the BARC, "resulting in good photoresist film formation and good features." (Spec. 5, ll. 3-4.)

7. Hasegawa describes photoresist compositions comprising a basic compound that may include purine derivatives (Hasegawa col. 28, l. 8), adenine derivatives (*id.* at l. 11), or guanine derivatives (*id.* at l. 12) among others.

8. The compositions described by Hasegawa further comprise a resist film polymer (Hasegawa col. 8, ll. 5-15) and light-absorbing photoacid generators (*id.* at col. 26, ll. 60-61.)

9. Sato describes photoresist compositions comprising organic bases, including substituted or unsubstituted purines (Sato 22, ¶ [0106].)

10. The compositions described by Sato further comprise alkali-soluble resins (Sato at 22, ¶ [0100]) as well as light absorbing materials, including dyes and photosensitizes (*id.* at ¶ [0101]).

11. Nishimura describes radiation sensitive resins comprising a base that may be a purine (Nishimura col. 50, l. 21).

12. The compositions described by Nishimura further comprise a resin and a light-absorbing photoacid generator. (Nishimura col. 2, ll. 63-67; Table 1 at cols. 72-73.)

C. Discussion

Toukhy, as the Appellant, bears the procedural burden of showing harmful error in the Examiner's rejections. *See, e.g., In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness") (citation and internal quote omitted).

During examination, "the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). It is, however, improper to read limitations from preferred embodiments in the specification into the claims. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1369 (Fed. Cir. 2004).

Enablement

The arguments of the Examiner and of Toukhy largely "pass in the night" without meeting. On the one hand, the Examiner maintains that elements of the antireflective coating composition that the 318 Specification appears to indicate are indispensable, such as the binder polymer and the radiation absorber, are not recited in the claims. Since limitations may not be read from the specification into the claims, the Examiner maintains that the claims are broad enough to read on antireflective compositions consisting of one or more of the recited bases. But, the Examiner objects,

such compositions are not enabled in view of the indications that antireflective coatings are known to further comprise binder polymers and optical absorbers. Toukhy responds that those skilled in the art understand that "[t]he term antireflective coating composition in itself contains polymers, binders and other components that make it work." (Br. 8, last paragraph.) Toukhy also points out that the prior art cited in the 318 Specification contains numerous examples of such antireflective coating compositions, (Br. 9-13), as does the 318 specification itself (*id.* at 13-14).

This is not a case in which the Applicants are attempting to broaden the scope of the claimed subject matter by arguing that a material disclosed to be critical to the function or properties of a device is merely optional, and need not limit the claimed subject matter. Rather, Toukhy is trying to claim an improvement on a well-known composition. Thus, while the Examiner has successfully pointed out the potential scope of the claims, Toukhy has shown that the preponderance of the evidence of record weighs in favor of the more limited scope—i.e., that the claimed antireflective composition comprises, at least, a polymeric binder, a radiation absorber, and the expressly recited base. (*See* Br. 8.) Moreover, the Examiner has not, other than by unsubstantiated implication, demonstrated that undue experimentation would have been required to make and use an antireflective coating composition limited to one or more of the bases.

We conclude that the Examiner's claim interpretation is too broad, and that the necessity of undue experimentation has not been shown. Accordingly, we REVERSE the rejection for enablement.

Anticipation

The rejection for anticipation also turns on the proper interpretation of the claimed subject matter. The subject matter recited by claim 1 covers an antireflective coating composition that comprises at least one of a recited set of bases. We have already concluded that, as a term of art, an antireflective coating composition also contains a polymer binder and a radiation absorber. We emphasize that claim 1 does not cover a multilayered structure comprising a bottom antireflective coating layer covered by a photoresist layer. Nor does claim 1 cover a method of making such a multilayered structure. We note further that claim 1 does not recite any limitations on the composition or properties—in particular, the solubility—of the photoresist. Hence, claim 1 does not positively limit the solubility of the base. We also note that claim 1 does not recite the function or the amount of base that must be present in the antireflective coating composition, nor the function of the base. Moreover, claim 1 does not recite the wavelength of radiation for which the antireflective coating composition must be effective.

Toukhy does not dispute with specificity the Examiner's findings that each of Hasegawa, Sato, and Nishimura teaches compositions comprising a base within the recited Markush Group, as well as a binder polymer and a light absorbing compound. Accordingly, we find Toukhy's complaint that the Examiner has relied on undue picking and choosing in support of the rejections for anticipation (Br. 18, *citing In re Arkley*, 455 F.2d, 586, 587 (CCPA 1972)) to be too generalized and unsupported by specific evidence and argument to be persuasive. We decline the implicit invitation to re-

examine the application *de novo* and to substitute our analysis for that of the Examiner or the Appellants: our primary role is one of review.

Toukhy's reliance on the claim requirement that the base not be soluble in a solvent of the photoresist composition is misplaced. That limitation in claim 1 is a characteristic only of the base itself. More concretely, claim 1 does not require a photoresist composition in contact with the claimed antireflective coating composition. Seen in this light, it is clear that the solubility of the recited bases is an inherent characteristic of every base within the scope of the recited Markush Group. Put another way, the claimed subject matter cannot be limited properly by the composition of an overlying layer that is not required by the claim. Accordingly, the presence of particular solvents used by the references for their photoresist compositions is irrelevant.

We conclude that Toukhy has not shown that the Examiner erred harmfully in finding that claim 1 does not define subject matter distinct from the prior art.

D. Order

We REVERSE the rejection of claims 1-9 and 32-37 under 35 U.S.C. § 112, first paragraph, as lacking an enabling disclosure.

We AFFIRM the rejection of claims 1-9 and 32-37 under 35 U.S.C. § 102(b) in view of Hasegawa.

We AFFIRM the rejection of claims 1-9 and 32-37 under 35 U.S.C. § 102(b) in view of Sato.

We AFFIRM the rejection of claims 1-9 and 32-37 under 35 U.S.C. § 102(e) in view of Nishimura.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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